

United States Patent [19]

Verkaart

[11] Patent Number: 4,759,749

[45] Date of Patent: Jul. 26, 1988

- [54] HEATER FOR PHYSIOLOGICAL FLUIDS
 [75] Inventor: Wesley H. Verkaart, Dubury, Mass.
 [73] Assignee: Level 1 Technologies, Inc., Plymouth, Mass.

[21] Appl. No.: 866,910

[22] Filed: May 27, 1986

[51] Int. Cl. A61F 7/12; H05B 1/00

[52] U.S. Cl. 604/113; 128/399; 165/67; 165/156; 422/46

[58] Field of Search 604/113, 114, 4, 53,
 604/80, 82, 259, 322; 128/399-401; DIG. 3;
 165/154, 156, 67, 68; 285/345, 231; 422/46

[56] References Cited

U.S. PATENT DOCUMENTS

- 1,873,590 8/1932 James 285/345
 2,432,592 12/1947 Stecher et al. 285/231
 2,910,981 11/1959 Wilson et al. 604/114
 3,064,649 11/1962 Fuson 128/400
 3,374,066 3/1968 Farrant 604/113
 3,643,733 2/1972 Hall et al. 165/154
 3,831,672 4/1974 Battisti 165/156
 4,066,119 1/1978 Stedman 165/67

- 4,437,513 3/1984 Castiglioni et al. 165/154
 4,475,584 10/1984 Martin et al. 165/154
 4,559,999 12/1985 Servas et al. 165/156
 4,562,890 1/1986 Matoba 604/113
 4,623,333 11/1986 Fried 604/113
 4,678,460 7/1987 Rosner 604/80

Primary Examiner—C. Fred Rosenbaum

Assistant Examiner—Mario Costantino

Attorney, Agent, or Firm—Berman, Aisenberg & Platt

[57]

ABSTRACT

A self-contained portable unit for heating physiological fluids is disclosed. A heat exchanger is disposable to ensure sterility, and the heat exchanger is attached to a heating system by inserting it between opposed fluid connection elements. One of the fluid connection elements is movable to permit the heat exchanger to be installed and removed easily by inserting one end of the heat exchanger in one of the fluid connection units and moving the other fluid connection unit into contact with an opposite end of the heat exchanger. The heating fluid is heated by an electric heating element and is circulated by an electric pump.

19 Claims, 5 Drawing Sheets